

Patent
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AMENDMENTS TO THE CLAIMS:

The listing of claims shown below will replace all prior versions, and listings, of claims in the Application:

1. (Original) A method for the characterization of a particle comprising the steps of:

observing a first physical position of a particle,

optically illuminating the particle to subject it to an optical force,

observing the second physical position of the particle, and

characterizing the particle based at least in part upon reaction of the particle to the optical force.

2. (Original) The method of claim 1 wherein the optical illumination includes an optical gradient field.

3. (Original) The method of claim 2 wherein the optical gradient field is a moving optical gradient field.

4. (Original) The method of claim 1 wherein the optical illumination includes an optical scattering force field.

5. (Original) The method of claim 1 wherein the optical illumination includes a moving optical gradient force field and another force.

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6. (Original) The method of claim 1 wherein the first position and second position are different.
7. (Original) The method of claim 1 wherein the positions are the same.
8. (Original) The method of claim 7 wherein the characterization includes non-movement as indicative of the state.
9. (Original) The method of claim 7 wherein the characterization includes a non-positional parameter.
10. (Original) The method of claim 9 wherein the non-positional parameter is rotation of the particle.
11. (Original) The method of claim 6 wherein the characterization involves a comparison of the first position and the second position.
12. (Original) The method of claim 11 wherein the amount of difference of movement indicates a characterization state.
13. (Original) The method of claim 11 wherein the direction of movement is indicative of a characterization state.
14. (Original) The method of claim 1 wherein the characterization utilizes the optophoretic constant of the particle.

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15. (Original) The method of claim 1 wherein the characterization utilizes the optophoretic signature of the particle.

Claims 16-43 (Cancelled)

44. (New) The method of claim 1, wherein the reaction of the particle to the optical force is dependent at least in part on the dielectric constant of the particle.

45. (New) The method of claim 1, wherein the particle is a cell.

46. (New) The method of claim 45, wherein the cell is unlabeled.

47. (New) A method for characterizing the physical state of a cell comprising the steps of:

observing the cell at a first position;

illuminating the cell with a moving optical gradient field;

observing the cell at a second position;

characterizing the physical state of the cell based on the displacement between the first position and the second position.

48. (New) The method of claim 47, wherein the physical state is a diseased state.

49. (New) The method of claim 47, wherein the cell is a live cell.

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50. (New) The method of claim 47, wherein the steps of observing the cell comprises the step of imaging the cell with an imaging system.

51. (New) The method of claim 47, wherein the cell is unlabeled.

52. (New) The method of claim 47, wherein the physical state is a cell undergoing apoptosis.

53. (New) The method of claim 47, wherein the physical state is a cell infected with a virus.

54. (New) The method of claim 47, wherein the physical state is a cell with elevated amounts of DNA.

55. (New) The method of claim 47, wherein the physical state is a cell with bound antibodies.

56. (New) The method of claim 47, wherein the physical state is a cell with bound ligands.

57. (New) The method of claim 47, wherein the physical state is protein expression level.

58. (New) The method of claim 47, wherein the physical state is cellular differentiation.

59. (New) The method of claim 47, wherein the physical state is cell cycle state.

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60. (New) The method of claim 47, wherein the physical state is cellular motility.
61. (New) The method of claim 47, wherein the physical state is organelle structure.
62. (New) The method of claim 47, wherein the physical state is age.
63. (New) A method for characterizing the physical state of one or more cells within a population of cells comprising the steps of:
- observing the positions of each cell of the population of cells at a first position;
 - illuminating the population of cells with a moving optical gradient field;
 - observing the positions of each cell of the population of cells at a second position;
 - and
 - characterizing the physical state of the one or more cells within the population based on the displacement of the one or more cells between the first position and the second position.
64. (New) The method of claim 63, wherein the physical state is a diseased state.
65. (New) The method of claim 63, wherein the population of cells comprises live cells.

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66. (New) The method of claim 63, wherein the steps of observing the positions of each cell of the population of cells comprises the step of imaging the population of cells with an imaging system.

67. (New) The method of claim 63, wherein the population of cells are unlabeled.

68. (New) The method of claim 63, wherein the physical state is one or more cells undergoing apoptosis.

69. (New) The method of claim 63, wherein the physical state is one or more cells infected with a virus.

70. (New) The method of claim 63, wherein the physical state is one or more cell with elevated amounts of DNA.

71. (New) The method of claim 63, wherein the physical state is one or more cells with bound antibodies.

72. (New) The method of claim 63, wherein the physical state is one or more cells with bound ligands.

73. (New) The method of claim 63, wherein the physical state is protein expression level of the one or more cells.

74. (New) The method of claim 63, wherein the physical state is cellular differentiation of one or more cells.

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75. (New) The method of claim 63, wherein the physical state is cell cycle state of the one or more cells.

76. (New) The method of claim 63, wherein the physical state is cellular motility of the one or more cells.

77. (New) The method of claim 63, wherein the physical state is organelle structure of the one or more cells.

78. (New) The method of claim 63, wherein the physical state is age.

79. (New) The method of claim 63, wherein the displacement of the one or more cells is dependent at least in part on the dielectric constant of the one or more cells.

80. (New) The method of claim 63, wherein the method characterizes the physical state of the entire population of cells.

81. (New) The method of claim 63, wherein the method characterizes the physical state of a sub-population of the entire population of cells.